REMOTE INSECT MONITORING WITH iSCOUT

Pessl INSTRUMENTS

ABIM 2020 Annual Biocontrol Industry Meeting

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SEP 2020

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1. Insect monitoring
2. Device and Type of iScout
3. Studies/trials and examples
4. Insect recognition: status quo, software

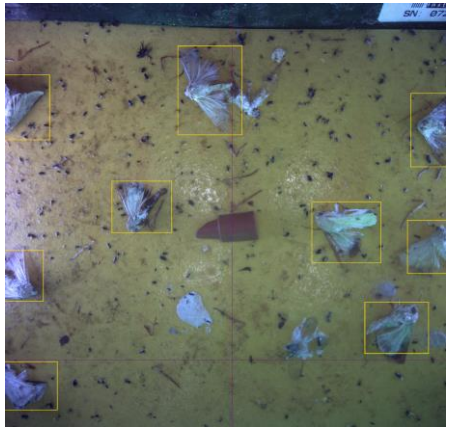
Monitoring = first action in pest management

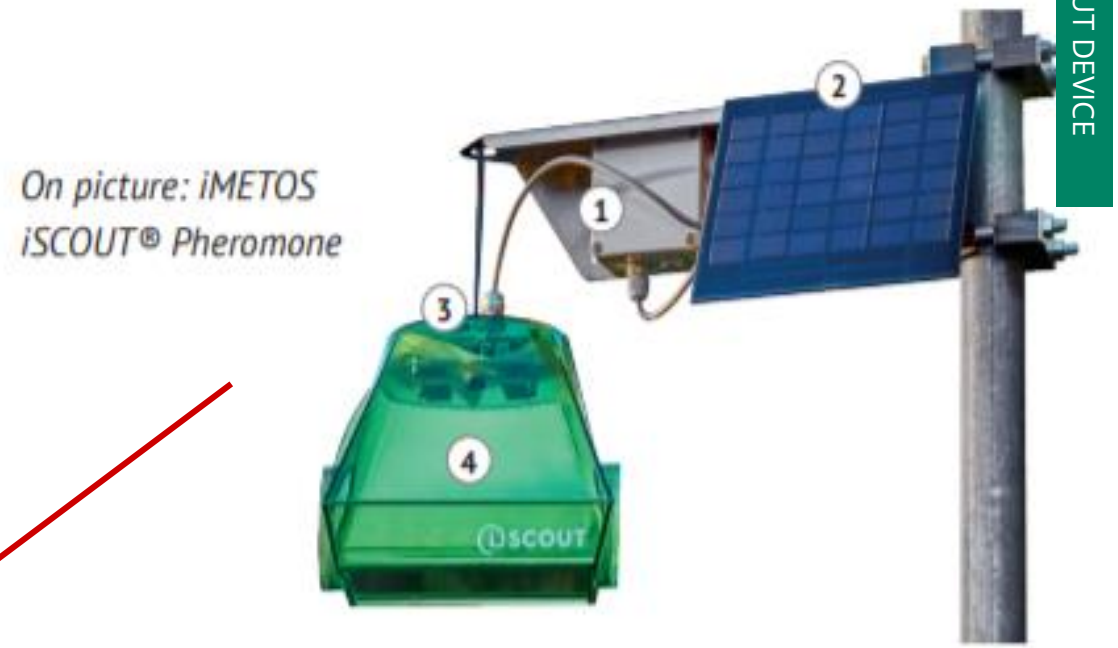
- Orchards, Crop production (field, greenhouses), storage, meadow (golf courses), forestry
- Adult stages (actively enter the trap systems)
  - attraction by pheromone, lure or colour
- Approach:
  - First occurrence
  - Following seasonal population dynamics
  - Distribution within a field /area
  - Identification of the pest

iSCOUT DEVICE

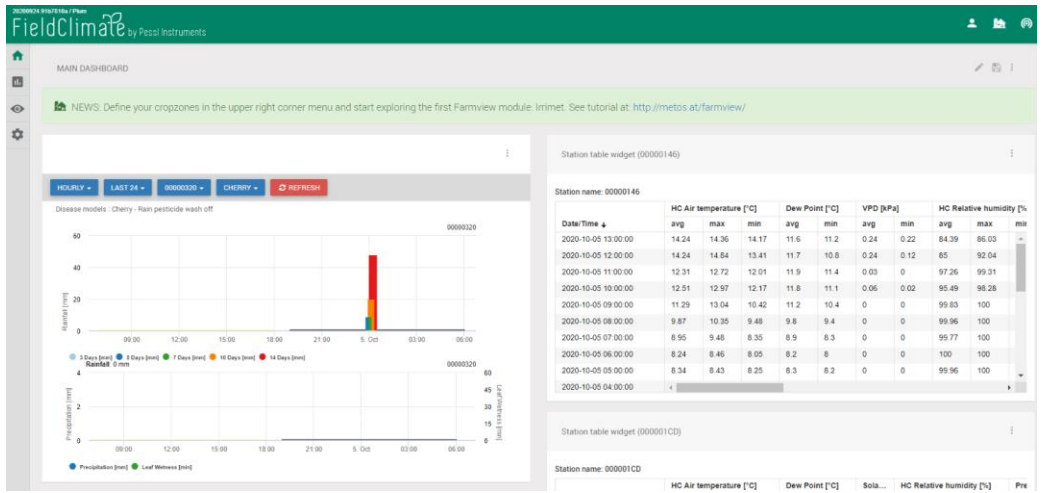
3 Main Parts:

- MAIN UNIT WITH Housing AND Camera
- CONTROL UNIT(LTE-GPRS, power supply,
- sensors)
- FieldClimate.com





1. Control unit; 2. Power supply (solar panel and battery); 3. Logger and modem; 4. Trap.



iSCOUT®

Insect monitoring - iSCOUT

- Combination of insect trapping and electronics (10 MP lens)
- Four devices, depend on the insect species and how to attract it (colour, pheromone, lure)
- Photos of glueboards in the trap are send over mobile network to FieldClimate.com
- ML: insect characteristics,
  dataset (worldwide), labeling: every object ,
  illumination (field conditions) ,

iSCOUT DEVICE

Trials

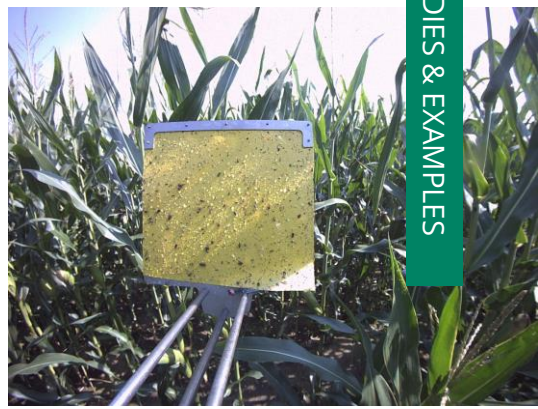
- Orchards (grape, apple, hazelnut), field crops, forestry
- Targets: moths /fruit flies/beetle/bug

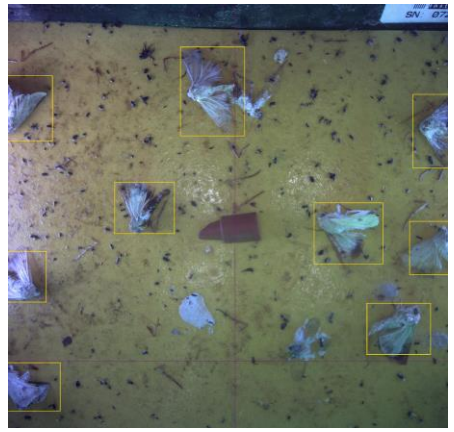
AIM

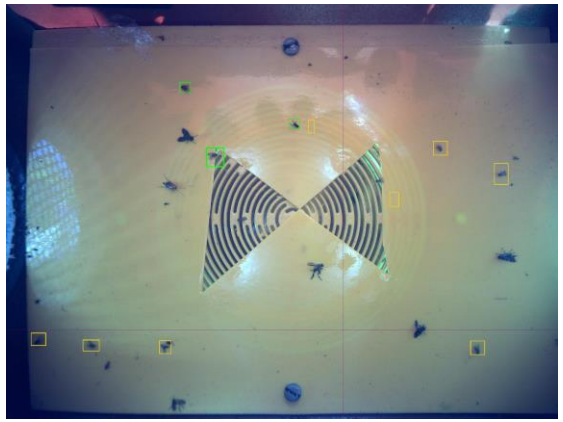
- Attract target insect and fix it on glue boards (combination with standard traps)
- camera system (objective) : resolution and recognition, illumination
- Settings: time of photos, SIM card
- lure/pheromone efficacy- recommend using local provider

RESULTS

- Insects are attracted by used lure/pheromone
- Different objectives are used, depend on iScout type
- Insects of a size of > 2mm could be seen in detail and identified (e.g. male of ***D. suzukii***)
- Glueboards with different layers depend on targets



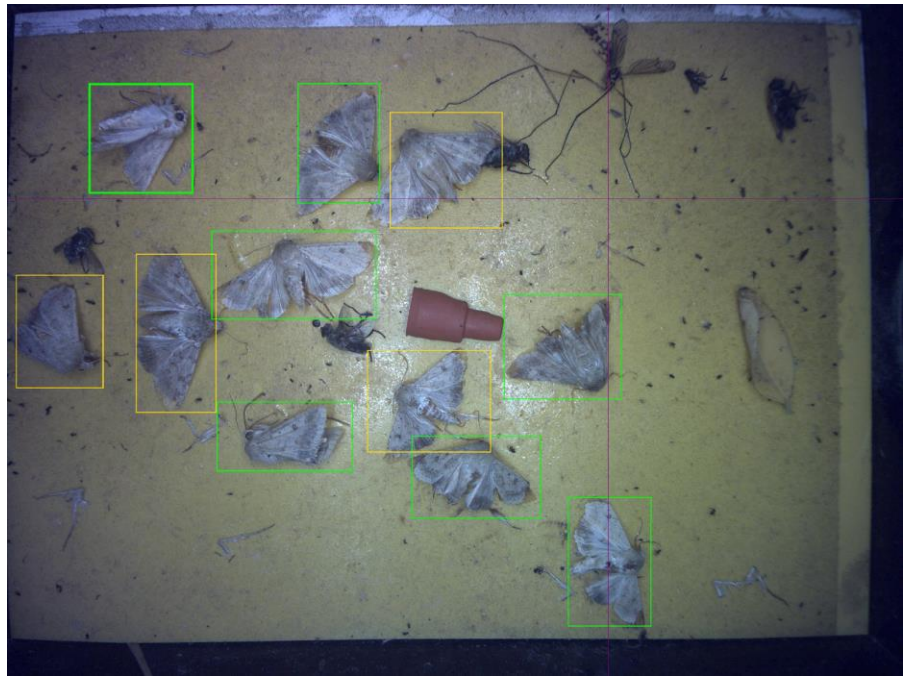




Examples

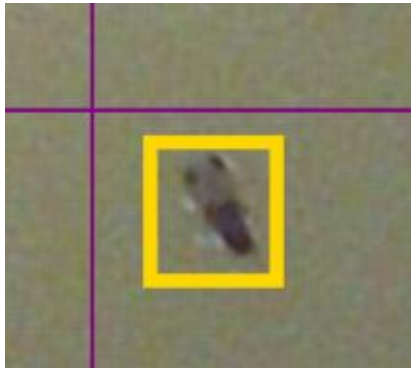
iSCOUT Pheromone:

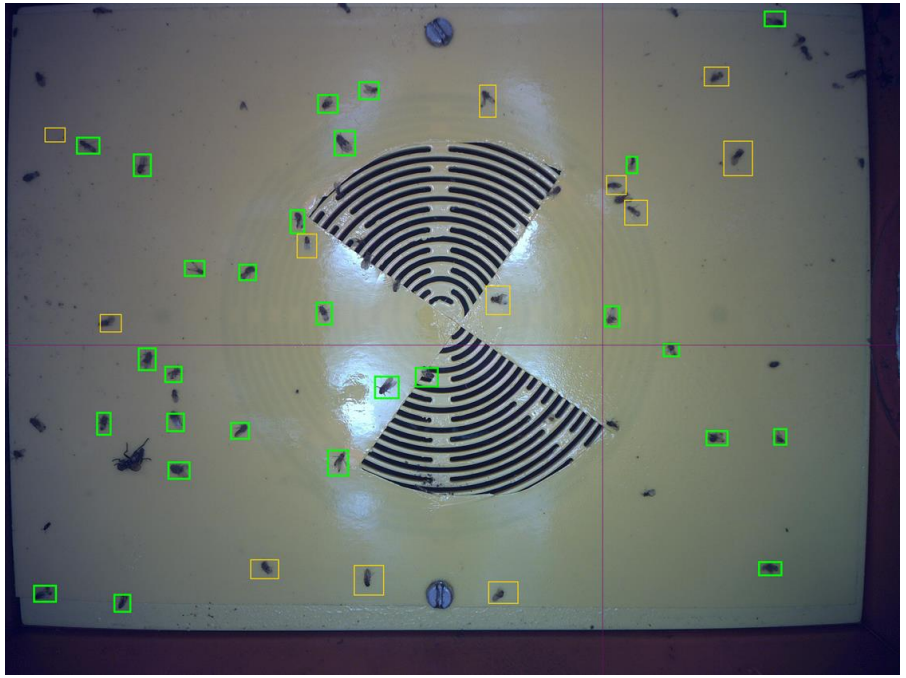
First occurrence and population dynamics



iSCOUT Fruit Fly:

FIRST occurrence, but not on the same level on population density than conventional used traps!!



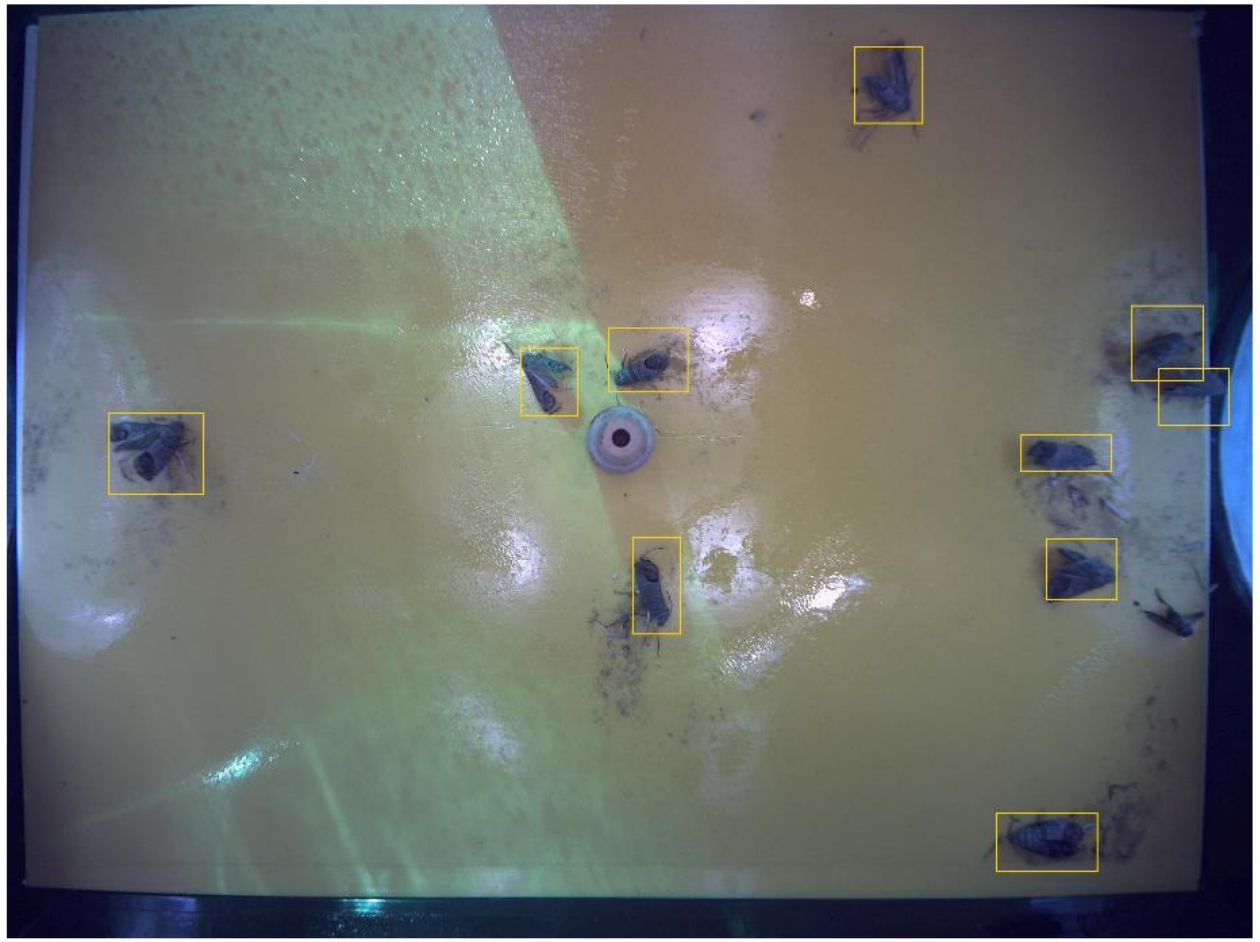


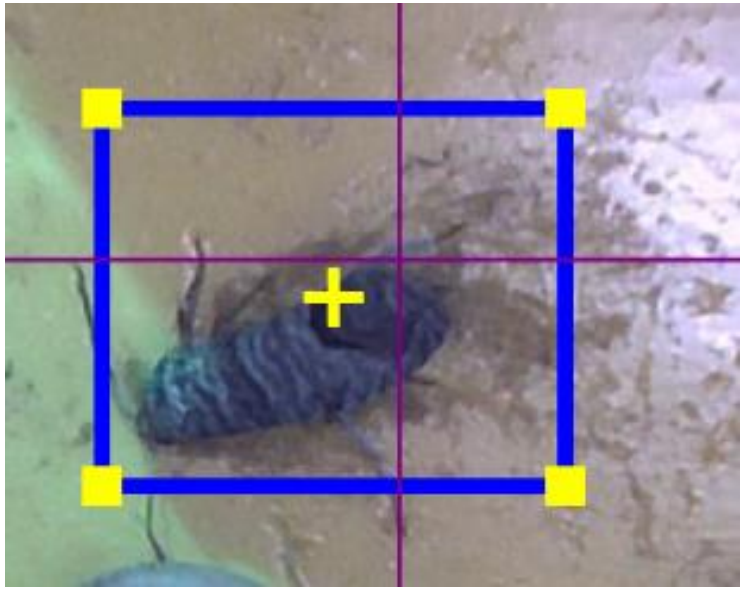
Potenzielle Schädlinge gefunden: 10
Neue Detektionen: 7

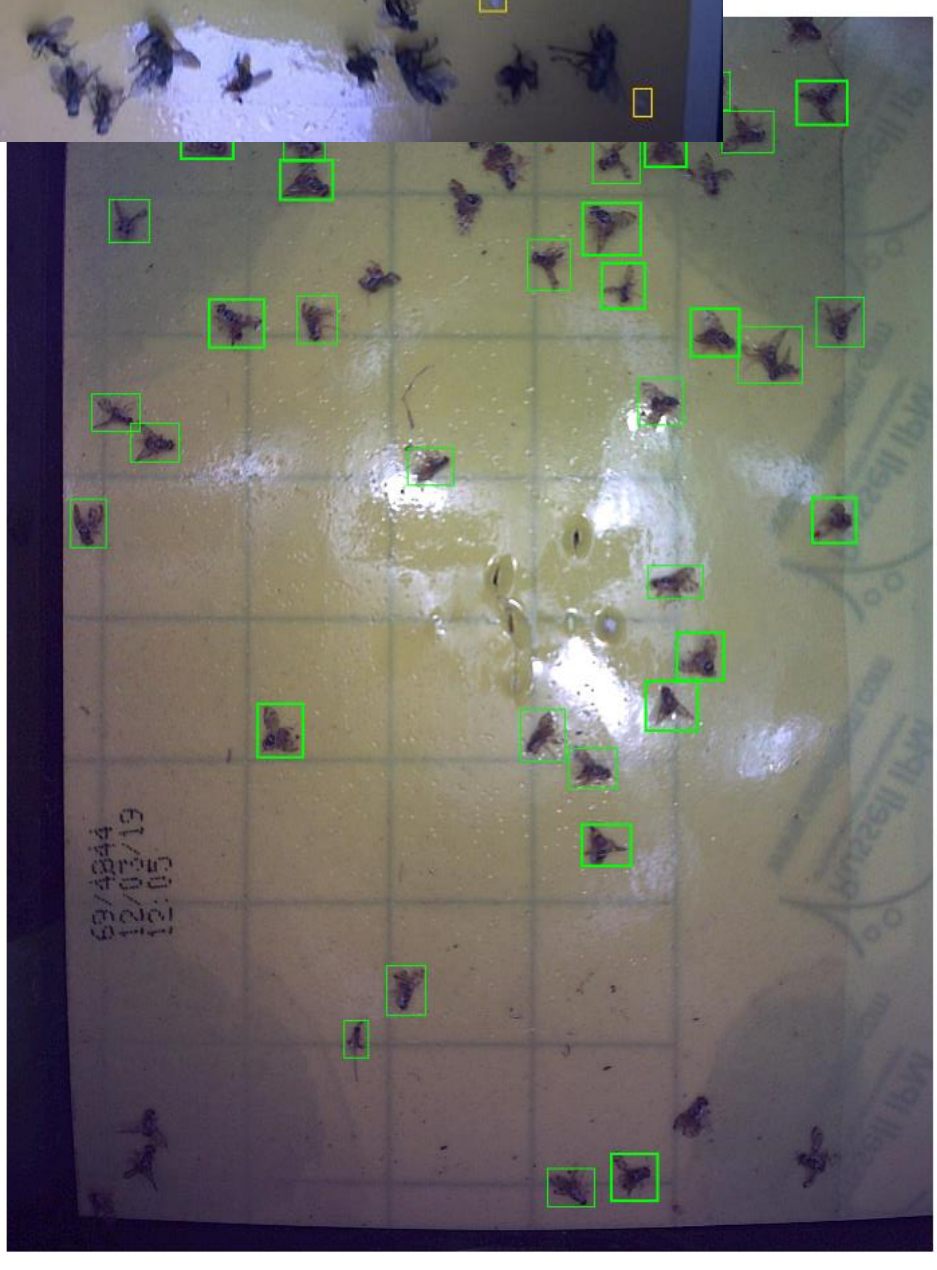
Ausgewählter Schädling:

BEMISIA TABACI

Cydia pomonella

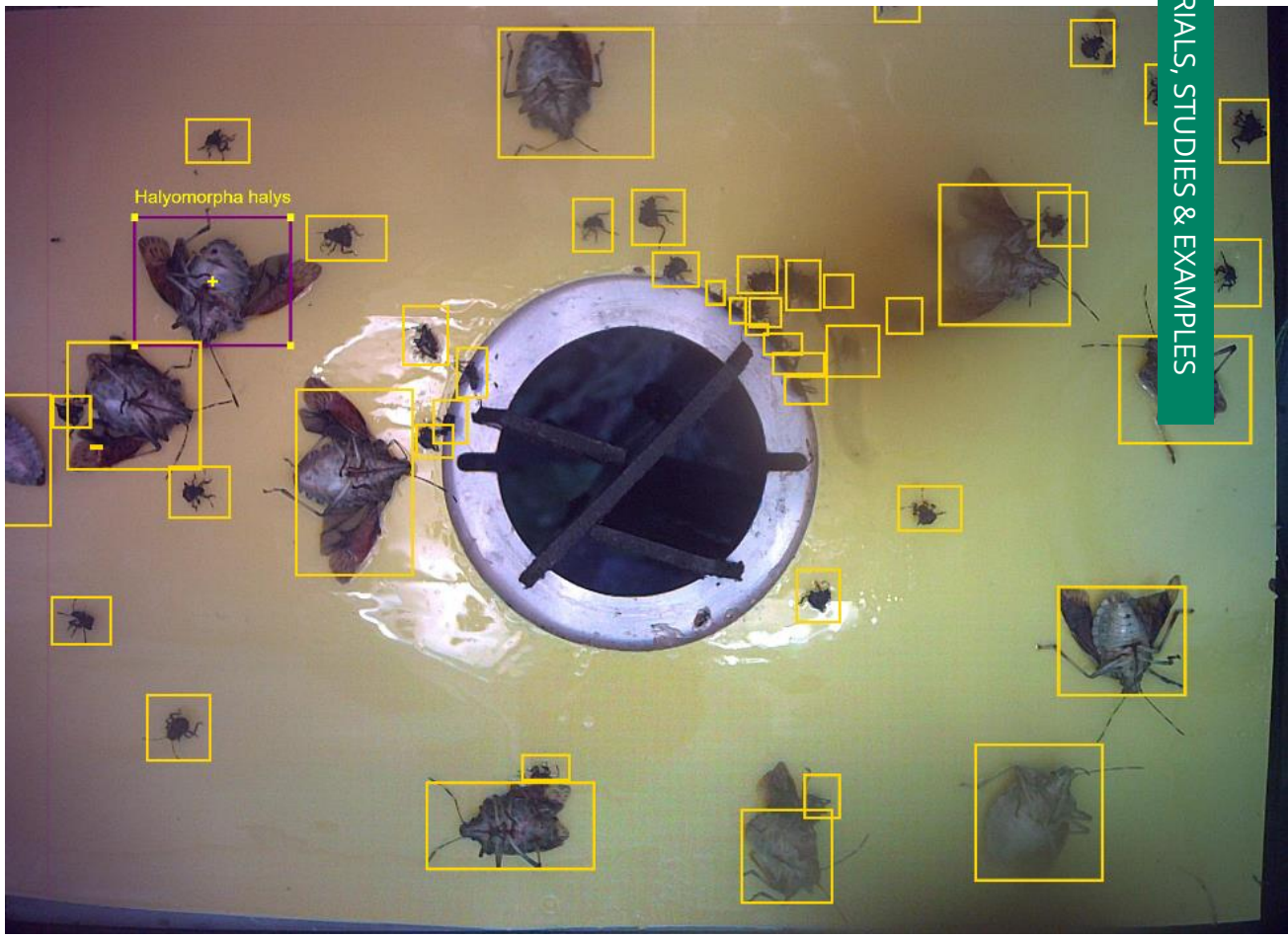


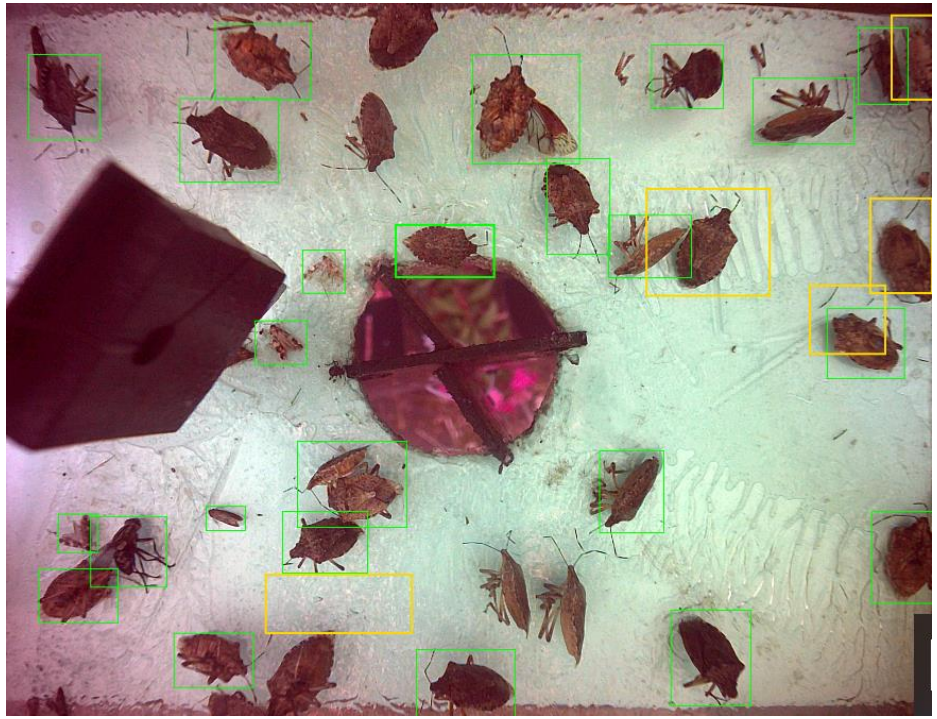




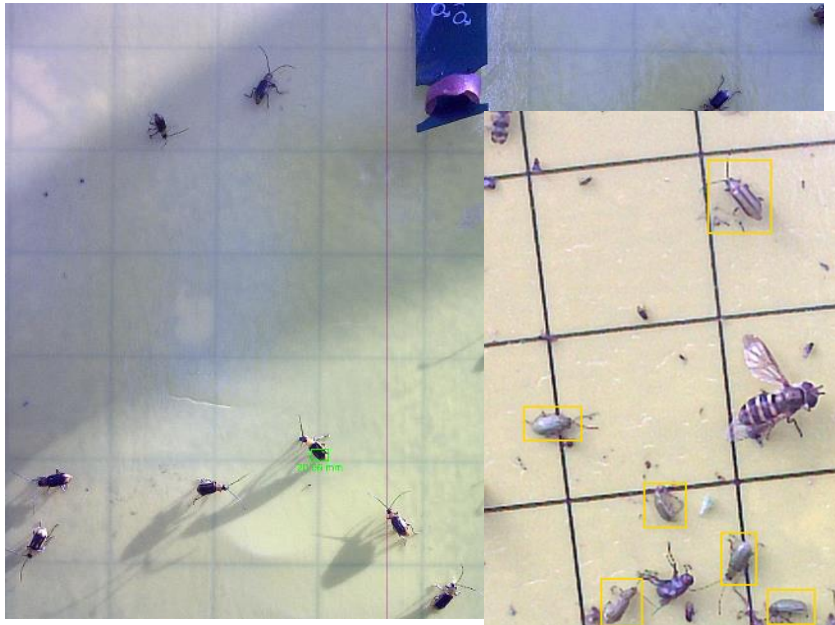
iSCOUT Bug:

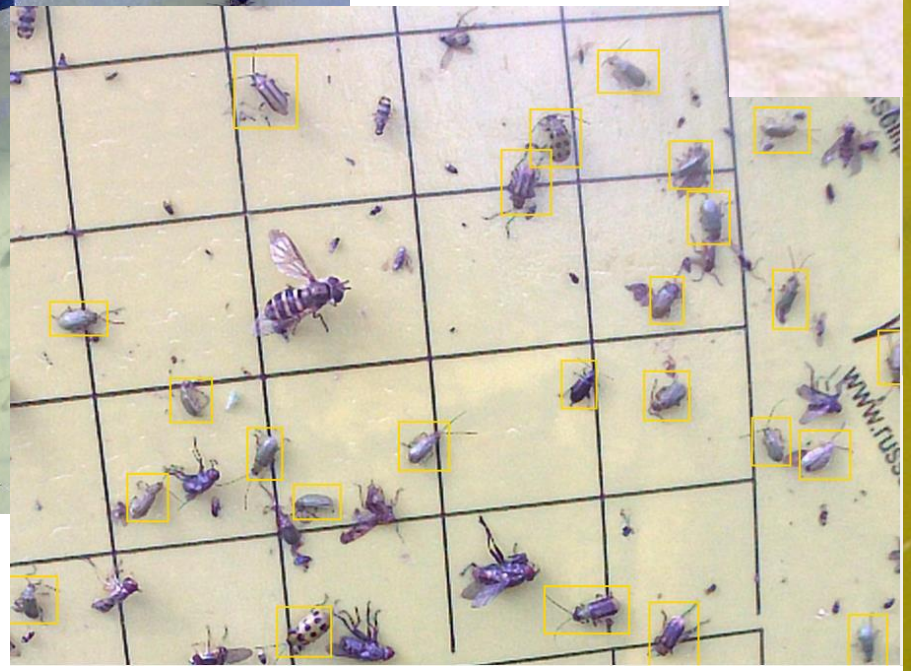
FIRST OCCURRENCE and Population dynamics possible, but strategy ? (aggregating more and more with used pheromone!), also nymph stages

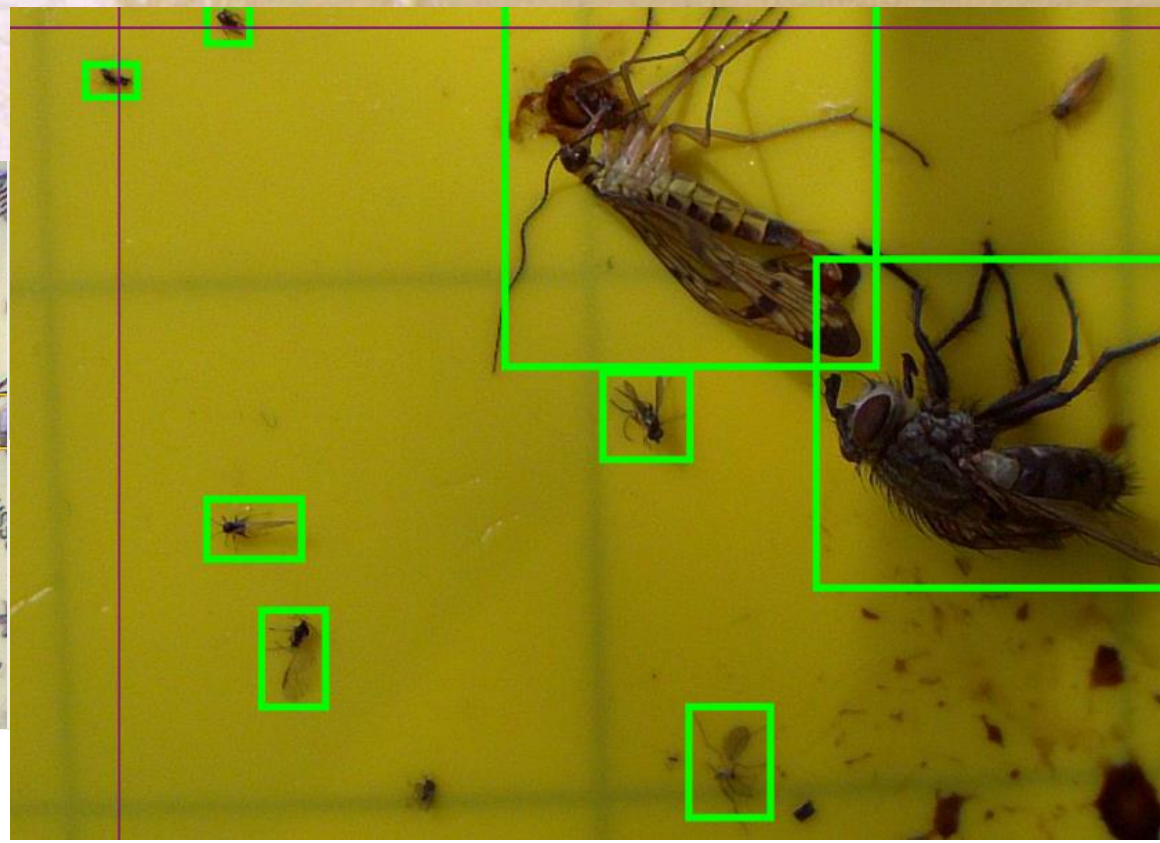




iSCOUT Color Trap



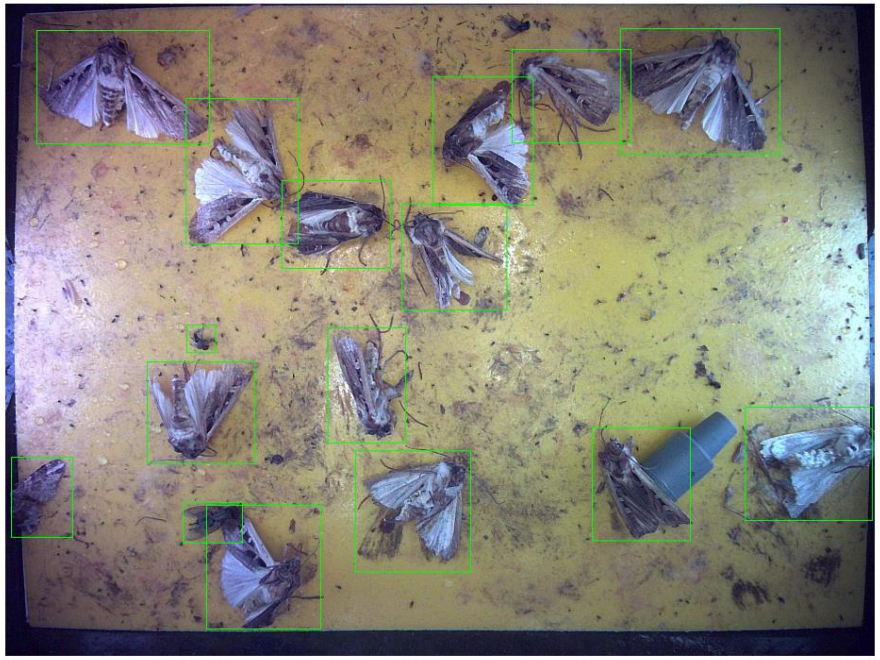


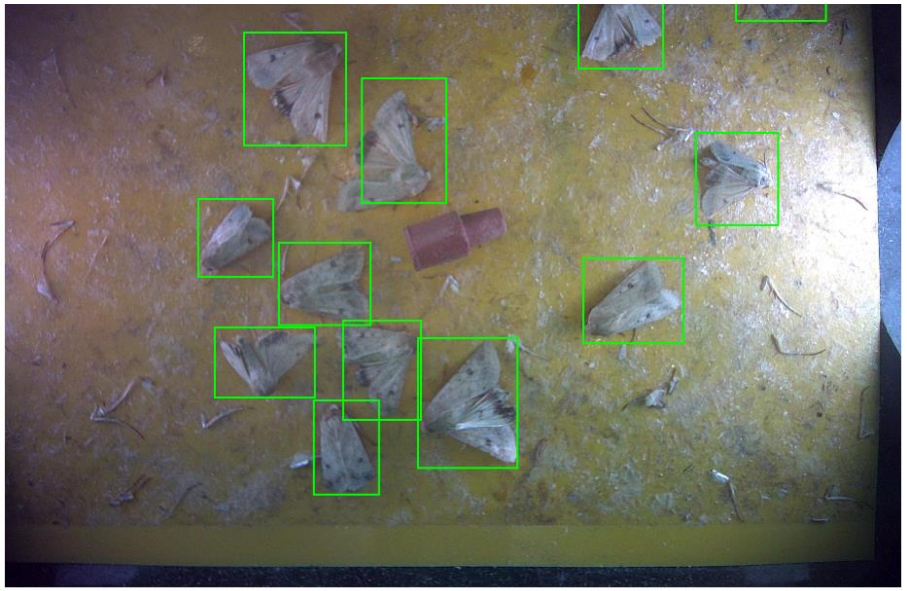


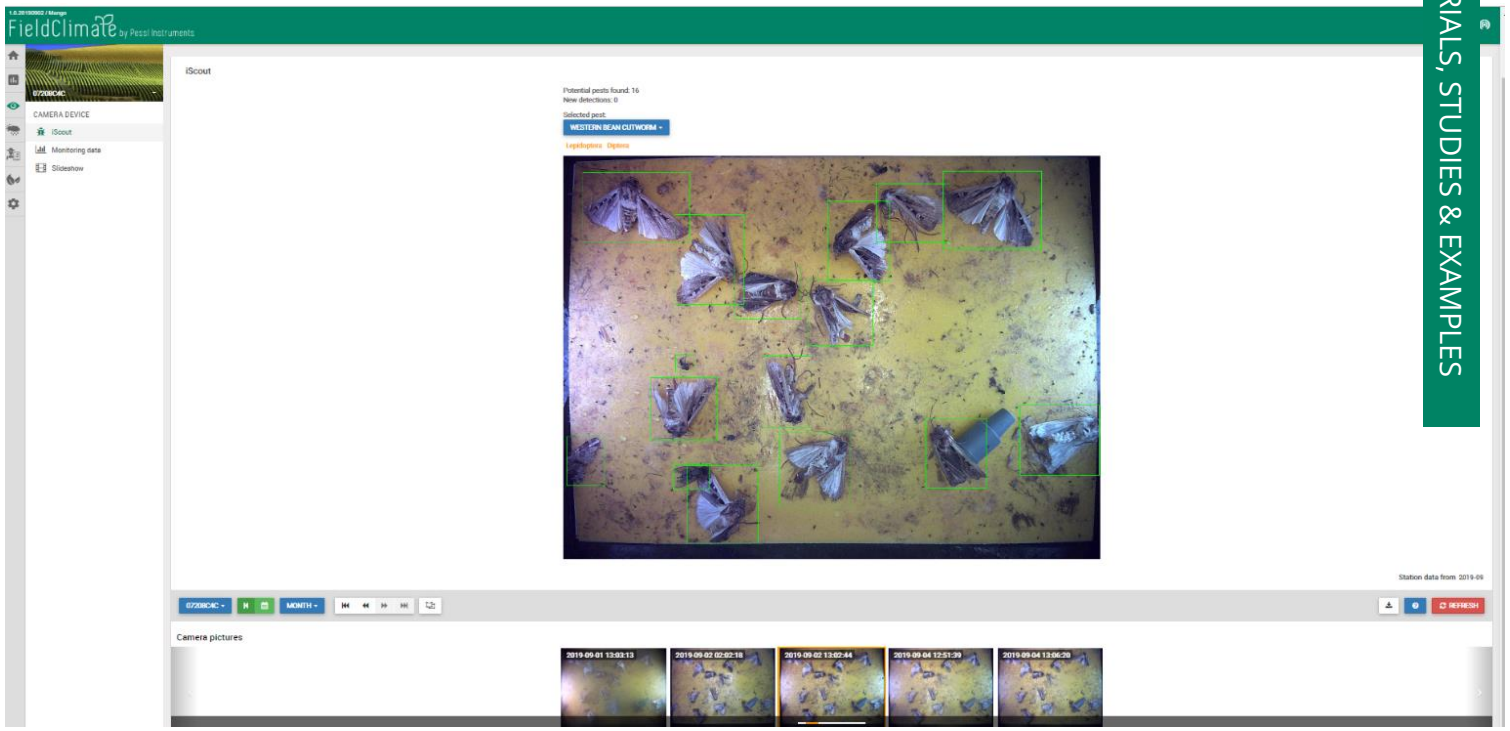
Selected pest:

WESTERN BEAN CUTWORM

Lepidoptera Diptera





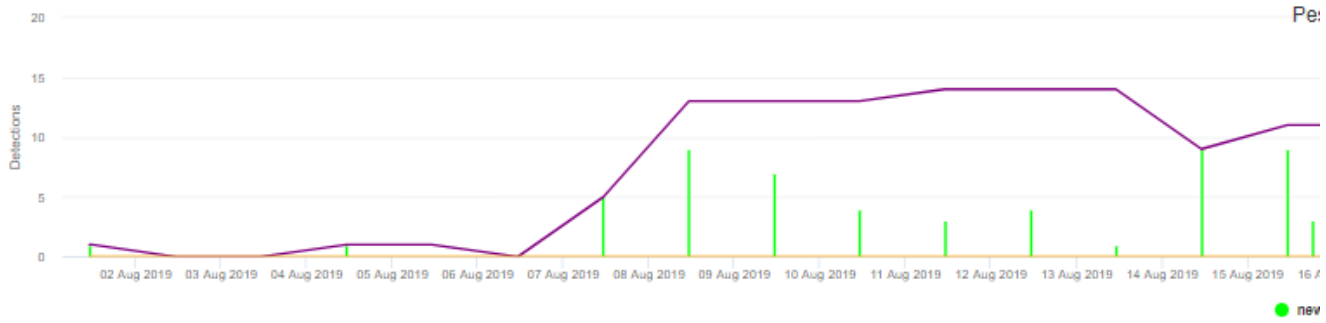


CAMERAS

07208C4C • iScout • Last data: 2019-09-20 16:15:00

Monitoring data

MONTH



Machine Learning

- Approach: identification of all objects on glue boards, extend and implement new species
- Different **properties of the insects** (color/size/specific dots on wings, etc...) and defines a logarithms (first characteristics for ORDER level, then we go deeper to species level
- Computer software based on **deep learning methods**: subset of machine learning algorithms, which uses deep artificial neural networks as models
- The actual version in FieldClimate is based on manual annotations of different species (for example: ***Lobesia botrana, Ceratitis capitata,Drosophila suzukii, Halyomorpha halys, Diabrotica virgifera, Helicoverpa armigera, Eupoecilia ambiguella, Bactrocera oleae and others….***) and difference now between **moths/beetles /bugs/ flies- so on order level**.
- labelling of insects is a process and going in a “loop” (labeling, pre-training and evaluation)
- We implement new annotations in 6 months intervals to get a better accuracy- more labels = more precision.

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